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71 Applicant: KABUSHIKI KAISHA TOSHIBA
72, Horikawa-cho Saiwai-ku
Kawasaki-shi Kanagawa-ken 210(JP)

72 Inventor: Endoh, Kenjiro Patent Division
Kabushiki Kaisha Toshiba 1-1, Shibaura
1-chome
Minato-ku Tokyo 105(JP)
Inventor: Yasuda, Osamu Patent Division
Kabushiki Kaisha Toshiba 1-1, Shibaura
1-chome
Minato-ku Tokyo 105(JP)

74 Representative: Henkel, Feiler, Hänzeler &
Partner
Möhlstrasse 37
D-8000 München 80(DE)

54 Recording/reproducing system with record restriction function.

57 An input section (11) inputs a recording signal to be recorded on a recording medium (T). An identification signal generator (14) generates a predetermined identification signal. A processor (13) is connected to the input section (11) and the identification signal generator (14), and selectively processes the recording signal and the identification signal. A detector (12) is connected to the input section (11), the identification signal generator (14), and the processor (13), and detects a recording restriction signal from the recording signal so as to control the processor (13) in accordance with a detection result. A recording section (REC) receives an output signal from the processor (13), and records the signal on the recording medium (T).

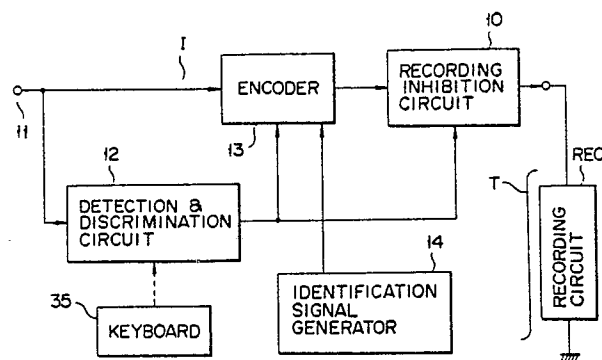


FIG. 2

Recording/reproducing system with record restriction function

This invention generally relates to a recording/reproducing system and, more particularly, to a recording/reproducing system which can provide a predetermined restriction on recording/reproduction.

In current systems of recording/reproducing an information source such as an audio or image signal, a variety of recording/reproducing systems such as a magnetic system, an optical system, and the like are proposed for, e.g., a variety of dynamic (storage) recording media including a tape-like recording medium, a disk-like recording medium, a card-like recording medium, and the like. These recording systems are put into various practical applications. These recording/reproducing systems preferably have recording/reproducing characteristics of high fidelity, as well as good operability. In addition, these systems preferably comprise functions requested by users as much as possible unless a social problem against, e.g., public order and morals, arises.

In the recording/reproducing systems as described above, recording media and recording/reproducing systems are independently dealt with. As long as recording/reproducing systems of an identical type are used, recording media have compatibility to be subjected to recording or reproduction in any apparatus. However, in some recording/reproducing systems to which no restriction for recording for the purpose of making a copy is provided, a user cannot sometimes easily record information since the recording media have compatibility.

Assuming that a recording medium which has recorded an information source is commercially available, if a purchaser makes a copy of the information source, the recording medium (copy) on which the information source is recorded by copying and one (original) on which the information source was originally recorded have an identical value. For this reason, if such copying is illegally performed in a large quantity for benefits by utilizing the compatibility of recording/reproducing systems, the value of the original recording medium on which the information source is recorded is largely reduced. In addition, the higher the fidelity of copies becomes, the lower the originality of the original recording medium which records the information source becomes.

In order to prevent this, some countermeasure for inhibiting such copying is inevitably taken. However, a conventional copy inhibition method described below is not satisfactory for a user. More specifically, in the conventional copy inhibition method, a signal representing a predetermined in-

hibition code is inserted in an information source and is recorded on a recording medium. If a recording/reproducing system detects the inhibition code in a transmission signal of a recording information source, it interrupts the recording function. For example, if a transmission format when an information source (in this case, a digital signal) is reproduced is a group of blocks (consisting of 1 to m bits), a predetermined position (n th-bit position) of each block or a specific block is assigned to a flag for representing inhibition: "0" and permission: "1" of a recording operation. The flag (or a code combining the flags) is detected by a recording/reproducing system which received a reproduction signal. If the flag represents inhibition of the recording operation, the recording function is interrupted. Interruption of the recording function can be achieved by various methods, such as disconnection of a signal path. If such a countermeasure is taken for all the recording/reproducing systems of an identical type, an information source including an inhibition code can be inhibited from being copied.

However, in the conventional method, since copying of the information source with the inhibition code is perfectly inhibited, recording that does not reduce a value of a recording medium recorded an information source, e.g., recording for personal use cannot be performed, either.

Upon developments of digital audio tape recorders (DATs), a conflict of interests as described above is seen between copyrights of soft tapes for the DATs and/or conventional compact disks (CDs) and cancellation of copy inhibition for personal use that is permitted legally or by judgement.

In the recording/reproducing systems which employ a conventional copy inhibition method, since restriction on copying is too complete or is not made at all, a recording/reproducing operation in a personal use desired by a user cannot often be satisfied. As a result, applications of the recording/reproducing system having good performance, such as DATs, are limited, thus preventing their wide spread use.

This also interferes promotion of industries, and is disadvantageous for a user since personal use of good information sources is disabled. Therefore, a strong demand has arisen for development of a recording/reproducing system having a predetermined copy restriction function which can provide a solution agreeable to both the copyright holder (including software industries) and the user.

In addition to a problem concerning a commercial information source, a user may want a recording/reproducing function for preventing a

third party to easily copy or reproduce a source recorded by a user, except for his personal use. The conventional recording/reproducing system which does not restrict copying at all, or which employs the above-mentioned copy inhibition method cannot meet such a requirement of the user.

It is, therefore, an object of the present invention to provide a new and improved recording/reproducing system with a record restriction function which can selectively inhibit recording/reproducing based on a predetermined restriction in order to satisfy a personal use requirement of a user.

According to a first aspect of the present invention, there is provided a recording apparatus with a record restriction function, the apparatus comprising:

input means for inputting a recording signal to be recorded on a recording medium;

identification signal generating means for generating a predetermined identification signal;

processing means, coupled to the input means and the identification signal generating means, for selectively processing the recording signal and the identification signal;

detection means, coupled to the input means, the identification signal generating means, and the processing means, for detecting a recording restriction signal from the recording signal, and controlling the processing means in accordance with a detection result; and

recording means for receiving an output signal from the processing means and recording the output signal on the recording medium.

According to a second aspect of the present invention, there is provided a recording apparatus comprising generation means for generating a predetermined index signal, recording means for recording a signal while the index signal is added to a recording signal, detection means for detecting the index signal from the recording signal, and inhibition means for inhibiting recording by the recording means when the index signal is detected from the recording signal.

With the above arrangement, when an information source is recorded, the recording means records the source after it adds a predetermined index signal (e.g., an identification code of an individual recording apparatus) to the information source or its sub signal (processing such as insertion or substitution). When the signal recorded in this manner is reproduced and is recorded again, since the recording signal to be recorded includes the index signal, the detection means detects this signal. The inhibition means inhibits recording in accordance with the detection output. In this manner, since copying from a copied recording me-

dium can be prevented, a predetermined restriction can be provided on copying.

According to a third aspect of the present invention, there is provided a recording apparatus comprising generation means for generating a specific identification signal, recording means for at least partially encoding a recording signal using the identification signal, discrimination means for discrimination whether the recording signal to be recorded is already encoded or not, and inhibition means for inhibiting recording by the recording means when the recording signal is already encoded.

With the above arrangement, when an information source is recorded, an information source or its sub signal is encoded using a specific identification signal (e.g., an identification code of an individual recording/reproducing system). When the signal recorded in this manner is reproduced and is recorded again, since the recording signal to be recorded is already encoded, the discrimination means detects this. The inhibition means inhibits recording in accordance with the discrimination output. In this manner, since copying from a copied recording medium can be prevented, a predetermined restriction can be provided on copying.

According to a fourth aspect of the present invention, there is provided a recording/reproducing system which comprises a recording apparatus comprising means for generating a specific identification signal, and means for detecting a predetermined input signal to record a signal in a state wherein the specific identification signal is added to a recording signal, and a reproducing apparatus which comprises means for detecting an identification signal from a read signal, and for discriminating whether the identification signal coincides with the specific identification signal or not, and means for disturbing outputting of the read signal when the discrimination result indicates a noncoincidence.

With this arrangement, when an information source which is restricted to be copied is recorded, an input signal indicating this is detected, and the signal is recorded while a specific identification signal (e.g., a code signal of an individual recording/reproducing system) is added to the information source or its sub code (e.g., processing such as insertion or substitution). When the signal recorded in this manner is reproduced, the recording signal can be normally reproduced only when an identification signal detected from the read signal coincides with the self-identification signal of the recording/reproducing system, i.e., only when the specific identification signal is known. In this manner, unless the specific identification signal added upon recording is known (or is generated), the recording signal cannot be reproduced by a re-

cording apparatus different from one which was used for recording, thus providing a predetermined restriction on copying.

According to a fifth aspect of the present invention, there is provided a recording/reproducing system which comprises a recording apparatus having means for generating a specific identification signal, and means for detecting a predetermined input signal to at least partially encode a recording signal using the specific identification signal, and a reproducing apparatus having means for decoding the signal encoded by the specific identification signal.

With the above arrangement, when an information source which is restricted to be copied is copied, an input signal indicating this is detected, and the information source or its sub signal is encoded using a specific identification signal (e.g., a code signal of an individual recording/reproducing system). When the signal recorded in this manner is to be reproduced, the recording signal can be decoded only when the specific identification signal is known. In this manner, unless a specific identification signal used upon recording is known (or is generated), the recording signal cannot be reproduced by a recording apparatus different from one which was used for recording, thus providing a predetermined restriction on copying.

These and other objects and features of the present invention can be understood through the following embodiments by reference to the accompanying drawings, in which:

Fig. 1A is a view showing a format of a digital information signal input to a recording/reproducing system;

Fig. 1B is a view showing a format of an analog information signal input to the recording/reproducing system;

Fig. 2 is a block diagram showing an arrangement of a recording section of a recording/reproducing system according to a first embodiment of the present invention;

Fig. 3 is a block diagram showing an arrangement of a reproducing section of the recording/reproducing system of the first embodiment;

Fig. 4 is a circuit diagram showing an identification signal generator of the first embodiment;

Fig. 5 is a circuit diagram showing an encoder and decoder of the first embodiment;

Figs. 6 and 7 are block diagrams respectively showing arrangements of recording and reproducing sections of a recording/reproducing system according to a second embodiment of the present invention;

Fig. 8 is a block diagram showing an arrangement of a recording section of a recording/reproducing system according to a third embodiment of the present invention;

Fig. 9 is a block diagram showing an arrangement of a reproducing section of the third embodiment;

Figs. 10 and 11 are circuit diagrams showing an output disturbing circuit of the third embodiment;

Fig. 12 is a perspective view showing an application or service system of a recording/reproducing system according to the present invention;

Fig. 13 is a block diagram of a card reader incorporated in a recording/reproducing unit shown in Fig. 12;

Fig. 14 is a perspective view showing another application or service system of the present invention; and

Fig. 15 is a block diagram showing a DAT to which the recording/reproducing system of the present invention and its application or service system are applied.

Some embodiments of the present invention will hereinbelow be described.

Figs. 1 to 5 show a recording/reproducing system according to a first embodiment of the present invention. Fig. 2 shows an arrangement of a main portion of recording section 1 of a recording/reproducing system of this embodiment. In Fig. 2, a recording information source is input to recording input terminal 11. In this case, the information source is a digital signal having a format shown in Fig. 1A, and has a restriction flag at its n th and $(n+1)$ th bits. When the restriction flag is set to be "00", it represents the presence of a copy restriction; "11", no restriction. Such an information source can be a signal or the like reproduced from a commercially available tape-like recording medium, i.e., a software tape. The input signal including the restriction flag is supplied from recording input terminal 11 to detection & discrimination circuit 12 and encoder 13. Detection & discrimination circuit 12 detects the restriction flag from the input signal, and discriminates whether the detected restriction flag is "00" or "11". Circuit 12 controls encoder 13 in accordance with the discrimination result. More specifically, when circuit 12 detects that the restriction flag is "00" (presence of restriction) (rank R), it causes encoder 13 to encode the input signal. Encoder 13 receives a self identification (ID) signal from ID signal generator 14. If the discrimination result corresponds to rank R, encoder 13 processes (e.g., scrambles) the input signal using the ID signal, and changes the restriction flag to be "01" (encoded) (rank E). The signal processed by encoder 13 is then converted

to a signal different from the input signal before processing, and is supplied to output terminal 15 together with the changed restriction flag "01". The signal is then recorded on recording medium T such as a magnetic tape by recording circuit REC including, e.g., a magnetic head through recording inhibition circuit 10 (to be described later). Meanwhile, when detection & discrimination circuit 12 determines that the restriction flag is "11" (no restriction) (rank F), encoder 13 supplies the recording input signal to recording circuit REC through recording output terminal 15 and recording inhibition circuit 10 without executing the encoding operation, by using the ID signal, or changing the restriction flag.

The arrangement of a main portion of reproducing section II of this embodiment will be described with reference to Fig. 3. A signal reproduced from recording medium T by reproducing circuit PB including, e.g., a magnetic head (not shown) is supplied to reproducing input terminal 16, and is then supplied to recording rank discrimination circuit 17 and decoder 18. Recording rank discrimination circuit 17 discriminates rank E (recorded in rank R), rank F, or rank R from the reproduced signal. More specifically, if the signal is recorded during the encoding operation, it must be decoded during the reproduction operation. Thus, circuit 17 determines the presence/absence of the encoding operation, and causes decoder 18 to decode (e.g., descramble) the signal if the encoding operation has been performed (rank E). The decoding operation in decoder 18 is performed based on an ID signal output from the same ID signal generator 14 as that shown in Fig. 2. Only when the ID signal is the same as that used in the encoding operation during recording, can the signal be converted to a normal signal before encoding. As described above, since the ID signal generated by ID signal generator 14 is a signal inherent to the generator, when the signal supplied to input terminal 16 has not been encoded based on the ID signal generated by ID signal generator 14 shown in Fig. 2, i.e., when ID signals used in the reproducing and recording sections are not the same, decoder 18 performs a wrong decoding operation, and as a result, outputs an insignificant signal to reproducing processor 20 through reproducing output terminal 19. When circuit 17 discriminates rank F or R, decoder 18 does not execute the above decoding operation, and supplies the reproducing input signal to reproducing output terminal 19. Then, normal reproducing processing is performed by reproducing processor 20.

A recording restriction function as a characteristic feature of this embodiment will be described below.

In Fig. 1 described above, when detection &

discrimination circuit 12 determines that the restriction flag of an input signal is "01" (rank E), recording inhibition circuit 10 inhibits the recording since this input signal is a signal reproduced from a copied recording medium (tape). Thus, an already copied recording medium (tape) can be prevented from being copied again. Recording can be prohibited by one or both of a cutting off of a recording signal and/or a stopping of the driving of the recording medium (travel in the case of tape).

This embodiment basically has the above-mentioned arrangements, and the components shown in Figs. 2 and 3 can be achieved by various arrangements based on conventional techniques. Detailed arrangements of these components will be briefly described below. Fig. 4 shows an arrangement of ID signal generator 14. When a specific code signal, e.g., a signal of several (n) bits such as "010011...01", is used as an ID signal, jumper lines or switches 23 are selectively inserted between terminals 21 for transmitting the corresponding bits of the code signal and ground terminals 22, thereby obtaining the specific code signal. The insertion of jumper lines or switches 23 is randomly performed during manufacturing, so that 2ⁿ code signals inherent to individual recording/reproducing systems can be generated. In another technique, a specific code signal can be stored in a read only memory (ROM). The ROM may comprise an electrically programmable ROM (EPROM), a Write Once ROM in which data can be electrically written only once, a mask ROM in which a code is determined upon LSI design, and the like.

Fig. 5 shows a detailed arrangement of encoder 13. Assuming that the above-mentioned code signal is output from ID signal generator 14, the code signal is then input to pseudo random series (PN) generator 24, and a PN signal is generated to have the code signal as an initial value. The PN signal is supplied to one input terminal of exclusive-OR gate 25. The other input terminal of exclusive-OR gate 25 receives a recording input signal supplied from input terminal 26 of encoder 13. As a result, a signal output from exclusive-OR gate 25 is converted to a scrambled signal which is different from the original input signal, and the scrambled signal is supplied to output terminal 27. The circuit shown in Fig. 5 can also be used as decoder 18. More specifically, if an identical code signal is supplied to PN generator 24 which has a timing that is equal to the signal supplied during encoding, the reproducing signal is descrambled by using the PN signal having the same code signal as that of the initial value, and the output signal from exclusive-OR gate 25 is converted to a signal equal to the input signal before encoding. As a technique for synchronizing the encoding and decoding timings, signals can be easily initialized

at a starting portion of a predetermined number of blocks of a recording signal, e.g., of each track in the case of a recording/reproducing method using a rotary head for a tape-like recording medium. Such scrambling is executed in the case of rank R, and descrambling is executed in the case of rank E. When rank F or rank R upon reproduction is detected, the input signal can be directly supplied from another input terminal (not shown) to the output terminal, or the operation of PN generator 24 can be stopped. Even if rank R or E is detected, descrambling need not always be performed for all the input signals. For example if an input signal consists of a main signal component and a sub signal component for controlling recording/reproduction of the main signal, descrambling may only need to be performed for one or part of these signal components. Various other arrangements of encoder 13 or decoder 18 may be employed.

According to this embodiment, when an information source which is restricted from being copied is recorded by the arrangement described above, the information source is encoded based on an ID signal inherent to the individual recording/reproducing system. Thus, the signal recorded in this manner cannot be reproduced as a normal signal unless it is decoded based on the specific ID signal or unless it is reproduced by a recording/reproducing system using the identical ID signal as that in the recording apparatus. For this reason, illegal copying which benefits those other than the person owning the copywrite, that allows reproduction by any recording/reproducing system, cannot be performed, thereby providing a rigid restriction on the illegal copying of tapes. Meanwhile, copying for personal use of users is not inhibited, thus meeting the users' requirements.

When an information source to be recorded has been encoded, copying from a copy tape can be inhibited since its recording is inhibited. Thus, a certain restriction can be provided to a user's personal use if so desired.

In this embodiment, the presence/absence of copy restriction is automatically discriminated from an information source, and the recording/reproducing system selectively processes this. Thus, no cumbersome operation is required for a user, resulting in good operability.

In this embodiment, the case has been exemplified wherein the information source is a digital signal. If the information source is an analog signal, the same basic arrangement remains the same and only some components need be slightly modified. For example, when a special signal is added to an ID code band at the upstream side of an audio band serving as an information source which is restricted to be copied, detection & discrimination

circuit 12 shown in Fig. 2 detects and discriminates the presence/absence of the special signal, and the same processing as described above is performed in an analog manner in accordance with the discrimination result.

Figs. 6 and 7 show a second embodiment of the present invention. The same reference numerals in Figs. 6 and 7 denote the same parts as in the first embodiment, and a detailed description thereof will be omitted. In the first embodiment, when an ID signal used for encoding does not coincide with that used for decoding, decoder 18 performs wrong decoding operation. In this case, a signal output from decoder 18 may become a signal which causes a loudspeaker to generate an uncomfortable sound or a signal which may damage an output circuit of reproducing processor 20. In order to prevent this, an unnecessary output signal is to muting, as is well known. Thus, this embodiment comprises an arrangement for discriminating whether or not the ID signal upon encoding coincides with that upon decoding in order to allow appropriate muting.

More specifically, as shown in Fig. 6, a recording section has combiner 31, as an encoding technique, which is connected to the output terminal of encoder 13. An ID signal output from ID signal generator 14 is also supplied to combiner 31, so that the recording signal is recorded while being added with the ID signal. Such processing is easy when both the recording and ID signals are digital signals. In a reproducing section, the added ID signal is detected from the reproducing signal by ID signal detector 32 connected to reproducing input terminal 16, and the detected ID signal is compared with an ID signal generated by ID signal generator 14 by comparator 33. If the comparison result indicates a noncoincidence, the output from decoder 19 is cut off by muting circuit 34 connected to the output terminal of decoder 18. If the comparison result of comparator 33 is displayed on display 35, an alarm of reproduction rejection can be given to a user. In this manner, a practical recording/reproducing system can be provided in addition to the same effect as in the first embodiment.

In this case, the recording section is arranged such that the ID signal added by the reproducing section can be detected by detection & discrimination circuit 12. If this detection is made, recording may be inhibited by recording inhibition circuit 10. Thus, a copy tape can be prevented from being copied again.

Only a different portion of a third embodiment shown in Figs. 8 and 9 from the above embodiments will be described hereinafter. In this embodiment, not an encoding (scrambling) technique but a direct switch technique is employed.

In a recording section shown in Fig. 8, an input recording signal including the ID signal is supplied from recording input terminal 11 to detection & discrimination circuit 12 and combiner 113. Detection & discrimination circuit 12 detects the restriction flag from the input recording signal, and discriminates whether the detected restriction flag is "0" or "1". Circuit 12 controls combiner 113 in accordance with the discrimination result. More specifically, when the restriction flag is "0" (presence of restriction) (rank R), circuit 12 causes combiner 113 to add an ID signal (to be described later) to the input signal. In this case, combiner 113 receives an ID signal inherent to ID signal generator 14. When the discrimination result represents rank R, the ID signal is added to the input signal. The recording signal with the ID signal output from combiner 113 is supplied to output terminal 15, and is then recorded on recording medium T by recording circuit REC. On the other hand, if circuit 12 determines that the restriction flag is "1" (no restriction) (rank F), combiner 113 does not execute addition of the ID signal (ID signal inherent to generator 14), and directly supplies the input signal to output terminal 15.

An arrangement of a reproducing section of this embodiment will now be described with reference to Fig. 9. A signal reproduced from recording medium T by reproducing circuit PB is supplied to reproducing input terminal 16, and is then supplied to ID signal detector 117 and output disturbing circuit 119. In this case, ID signal detector 117 detects, from the reproduced signal, the ID signal recorded in rank R, and supplies the detected ID signal to comparator 118. Comparator 118 compares the detected ID signal with an ID signal output from ID signal generator 14, and controls output disturbing circuit 119 in accordance with the comparison result. More specifically, when the ID signals input to comparator 118 do not coincide with each other, propagation of the reproduced signal to output terminal 19 is disturbed by output disturbing circuit 119. In this case, a noncoincidence between the two ID signals means that the reproduced signal was recorded in rank R, and was recorded by an apparatus different from a reproducing apparatus. More specifically, the ID signal generated by ID signal generator 14 is a signal inherent to the generator. If a signal supplied to reproducing input terminal 16 does not include an ID signal generated by generator 14 shown in Fig. 8, i.e., if a reproducing apparatus is not the same as a recording apparatus, the comparison result by comparator 118 will not indicate a coincidence. If the comparison result indicates a coincidence, comparator 118 stops the disturbing operation of output disturbing circuit 119. When the reproduced signal has been recorded in rank F, output disturb-

ing circuit 119 does not execute the disturbing operation, and supplies the input signal to output terminal 19. Then, normal reproduction processing is executed by reproducing processor 22.

In this manner, as long as a signal is not reproduced by the same apparatus as a copying apparatus, a normal signal cannot be reproduced.

A recording restriction function as the characteristic feature of this embodiment will be described below.

When the reproducing input signal already includes the ID signal by the above-mentioned technique, it is detected by ID signal detector 121, and is then supplied to recording inhibition circuit 122. When the ID signal is detected by ID signal detector 121, recording inhibition circuit 122 cuts off a signal path or stops traveling of recording medium T when it is a tape, or performs both these operations, thereby inhibiting recording. In this manner, copied recording medium T can be prevented from being copied again.

Figs. 10 and 11 show detailed arrangements of output disturbing circuit 119. In Fig. 10, switch 43 is arranged between input and output terminals 41 and 42 of output disturbing circuit 119. When the output from comparator 118 is a disturbing execution signal (indicating a noncoincidence between two ID signals), switch 43 simply cuts off the output. In Fig. 11, when the disturbing execution signal is output from comparator 118, pseudo random series (PN) generator 51 generates a PN signal in response to the signal, and supplies the PN signal to one input terminal of exclusive-OR gate 52. The other input terminal of exclusive-OR gate 52 receives a reproduced signal. Thus, the signal output from exclusive-OR gate 52 is converted to a scrambled signal different from the reproduced signal, and is then supplied to output terminal 42. Such scrambling is executed when comparator 118 detects a noncoincidence between the two ID signals. If a coincidence is found or rank F is detected, other processing can be performed. For example, the reproduced signal may be directly supplied to the output terminal from another input terminal (not shown) or the operation of PN generator 51 may be stopped. Even if a noncoincidence is detected, the above-mentioned scrambling need not always be performed for all the reproduced signals. For example, assuming that a reproduced signal consists of a main signal component and a sub signal component for controlling reproduction of the main signal (e.g., a signal for determining a fundamental mode of the main signal component, e.g., a sampling frequency, the number of channels, emphasis characteristics, or the like), the scrambling may be performed for the sub signal component. Various other arrangements of output disturbing circuit 119 may be employed.

Another detection technique of ID signal detector 117 may be employed. More specifically, an ID signal is not often easily detected if it is not a predetermined signal. In this case, the ID signal is recorded together with predetermined detection data. For example, the ID signal is inserted in a portion of a recording format after given data such as "0101" is added to the starting portion of the ID signal. Upon reproduction, the ID signal is detected based on the given data.

Although not shown, another technique for discriminating a rank (R or F) of a reproduced signal may be adopted. In this technique, when a signal is recorded in rank R, a predetermined signal portion which does not influence a main signal is converted to a given signal (e.g., "11"), and in the case of rank F, an all-"0" signal is recorded in a portion in which the ID signal is to be recorded, thereby allowing discrimination of the rank.

According to this embodiment, when an information source which is restricted to be copied is recorded by the above arrangement, it is recorded after an ID signal inherent to an individual recording/reproducing system is added thereto. The ID signal of the signal recorded in this manner is checked upon reproduction, and unless the specific ID signal is detected, i.e., unless the signal is reproduced by the same apparatus as a recording apparatus, it cannot be reproduced as a normal signal. For this reason, when the above arrangement is provided to an identical type of recording/reproducing system, illegal copying for benefits, that allows reproduction by any recording/reproducing system, cannot be performed, thus providing a strict restriction to copying. Meanwhile, copying for a personal use of a user is not inhibited, thus meeting user's requirements.

When an information source to be recorded includes an ID signal, since its recording is inhibited, copying for a personal use of a user can be subjected to a certain restriction if so desired.

In the third embodiment, the case has been exemplified wherein an ID signal inherent to the apparatus is used as an index signal. However, the present invention is not limited to this. For example, a predetermined pattern common to several apparatuses used by a user may be employed as an ID signal.

As still another embodiment, the following arrangement may be employed. Detection & discrimination circuit 12 in the above embodiments discriminates the presence/absence of copy restriction in accordance with a signal included in an information source. Alternatively, copy restriction processing may be executed by discriminating a signal from keyboard 35 (see Figs. 2 and 6) of the recording/reproducing system. In this manner, even

when an information source which is not restricted to be copied is recorded, a restriction can be provided depending on a user's will, so that a source recorded by a user cannot be easily reproduced by a third party.

In the above embodiments, if recording inhibition circuit 10 or 122 is omitted, a record restriction effect can be provided. More specifically, in the reproducing section in the above embodiment, in order to reproduce recording medium T copied already, it can be reproduced only when it is reproduced by an apparatus having the same ID signal as that added upon recording is detected, i.e., only by a user of the corresponding recording/reproducing system; otherwise, reproduction is impossible. Thus, even though an information source is again copied from copied recording medium for the purpose of illegal use, the again copied source cannot be reproduced by another apparatus, and in practice, such copying is nonsense.

ID signal generator 14 in the above embodiments is incorporated in the recording/reproducing apparatus. The ID signal generator may be arranged as a unit separate from the recording/reproducing apparatus, and may be detachably arranged with the apparatus. In this manner, a range of restriction that inhibits reproduction of a recording medium which is restricted to be copied by an apparatus different from the recording apparatus is moderated, and only when a user possesses an ID signal generator unit used upon recording, he can reproduce the recording medium. Such an arrangement is effective when a user manages a plurality of recording/reproducing apparatus.

In this invention, an ID signal generator used upon recording need not always be used upon reproduction. That is, it need only be discriminated whether an ID signal added upon recording is one inherent to the reproducing apparatus. For example, when an information source is subjected to predetermined conversion (modulation) and recorded after an ID signal is added thereto upon recording, the ID signal detected upon reproduction may be different from the original ID signal. In this case, a signal to be compared with the detected ID signal is one corresponding to conversion upon recording.

A signal which is encoded by special technique need only be decoded by the corresponding special technique, and a signal used in the special technique is an ID signal. For this reason, an identical ID signal need not be used during encoding and decoding. For example, when a decoder itself is designed based on a special technique, a signal used therein may be associated with a signal used upon encoding but may be different therefrom.

Various other embodiments of the present in-

vention may be employed in addition to the above embodiments, and the same effects as described above can be obtained as long as they are made within the spirit and scope of the invention.

As described above, a recording/reproducing system of the present invention can selectively inhibit copying with a predetermined restriction, and can meet user's requirements of a recording/reproducing operation.

A recording apparatus of the present invention can inhibit copying of a copied recording medium, as described above, and a given restriction can be provided to a recording operation in a personal use by a user.

An application or service system for a user using a recording/reproducing system comprising the above-mentioned recording restriction function will be described below. Such an application or service system is desired to eliminate an inconvenience since personal recording/reproducing is currently permitted in only an identical recording/reproducing system as described above. More specifically, recently, personal recording/reproduction of an information source is not limited to that performed only by a single recording/reproducing system installed in user's home. Average users normally selectively utilize a home system, a carmount system, a portable system, and the like depending on their needs.

In an application or service system proposed in this embodiment, one or a plurality of ID cards (including magnetic card, and an IC card) or keys (including electronic keys and magnet keys) having an ID code corresponding to an ID signal for each recording/reproducing system described in each of the above embodiments are given to a user. A user inserts the ID card or keys in a variety of systems to be used, thus allowing personal use in any of the above-mentioned systems.

Fig. 12 schematically shows a magnetic card type recording/reproducing system employing such a system. An ID code corresponding to the above-mentioned ID signal is magnetically recorded on magnetic stripe 202 of magnetic card 201. Magnetic card 201 is inserted in card insertion port 204 of recording/reproducing unit 203. Recording/reproducing unit 203 incorporates the recording and reproducing sections of the above embodiments, and a card reader shown in Fig. 13. More specifically, the ID code recorded on magnetic stripe 202 of magnetic card 201, which is read by magnetic head 205, is supplied to register 209 through amplifier 206, demodulator 207, and data separator 208. In this case, a card No., a manufacturer's code, or the like may be utilized in addition to the ID code, as needed. Register 209 acts as identification signal generator 14 in each of the above embodiments. The ID code from register

209 is compared by comparator 33 or 118 with the detected ID code from ID signal detector 32 or 117 in each of the above embodiments, as shown in Figs. 7 and 9.

Fig. 14 schematically shows a system employing a magnet key system. Magnet key 301 is provided with predetermined ID code 302. Magnet key 301 is inserted in key insertion port 304 of recording/reproducing unit 303. Thereafter, ID code generation corresponding to the above-mentioned magnetic card system is performed although not shown.

In Figs. 12 and 14, reference numerals 200 and 300 denote an insertion slot for recording media for recording/reproducing an information source.

Alternatively, ID signal generator 14 may be omitted, and an ID code fetched from the magnetic card or the like may be converted to an ID signal.

Fig. 15 shows an embodiment when the arrangements shown in Figs. 8, 9, and 13 are applied to a DAT (digital audio tape recorder). An analog or digital input selected by switch SW upon recording is input to combiner 113 through A/D converter 401 or deformatter 402. The description of recording section I employs that of Fig. 8. The output from recording inhibition circuit 122 is recorded on tape T as a recording medium by rotary head 409 through error code adding circuit 405, modulator 406, and amplifier 407. Rotary head 409 is switched by head switching circuit 408.

During reproduction, a reproduced signal from rotary head 409 is separated into audio data and an ID signal through amplifier 410, demodulator 411, error correction circuit 412, and data separator 413, which constitute reproducing circuit PB. The ID signal is supplied to ID signal detector 117 of reproducing section II. The description of reproducing section II employs that of Fig. 9. The audio data is supplied to reproducing processor 20 through output disturbing circuit 119. Reproducing processor 20 has D/A converter 403 for obtaining an analog output, and formatter 404 for obtaining a digital output.

ID signal generator 14 is commonly used for recording and reproducing sections I and II. When the application or service system described above is employed, an ID code input from a magnetic card, a magnet key, a keyboard, or the like can be fetched through register 209 and passing through the switch 210, the ID code from the magnetic card etc. is given to comparator 118.

Claims

1. A recording apparatus with a copy restriction function, said apparatus comprising:

input means (11) for inputting a recording

signal to be recorded on a recording medium (T);
characterized by said apparatus further comprising:

identification signal generating means (14) for generating a predetermined identification signal;

processing means (13), coupled to said input means (11) and said identification signal generating means (14), for selectively processing the recording signal and the identification signal;

detection means (12), coupled to said input means (11), said identification signal generating means (14), and said processing means (13), for detecting a recording restriction signal from the recording signal, and controlling said processing means (13) in accordance with a detection result; and

recording means (REC) for receiving an output signal from said processing means (13) and recording the output signal on said recording medium (T).

2. An apparatus according to claim 1, characterized in that said processing means (13) includes means for selectively synthesizing the recording signal and the identification signal.

3. An apparatus according to claim 2, characterized by further comprising:

identification signal detection means (121), coupled to said input means (11), for detecting the identification signal from said recording signal; and

recording inhibition means (122) for receiving a detection output from said identification signal detection means and inhibiting a recording operation by said recording means (REC).

4. An apparatus according to claim 3, characterized in that said recording inhibition means (122) includes switch means (43).

5. An apparatus according to claim 1, characterized by further comprising:

recording inhibition means (10) for receiving an output from a said detection means (12) and inhibiting a recording operation by said recording means (REC).

6. An apparatus according to claim 1, characterized in that said processing means (13) includes means (13) for at least partially encoding the recording signal based on the identification signal.

7. An apparatus according to claim 5, characterized in that said encoding means includes scramble means (24 - 27).

8. A reproducing apparatus comprising:

reproducing means (PB) for reproducing a recording medium to obtain a reproduced signal;

characterized by said apparatus further comprising:

identification signal generating means (14) for generating a predetermined identification signal;

processing means (18), coupled to said

reproducing means (PB) and said identification signal generating means (14), for selectively processing the reproduced signal and the identification signal; and

detection means (32), coupled between said reproducing means (PB), said identification signal generating means (14), and said processing means (18), for detecting the identification signal from said reproduced signal and controlling said processing means (18) in accordance with the detection result.

9. An apparatus according to claim 8, characterized in that said processing means (18) includes output disturbing means (119).

10. An apparatus according to claim 8, characterized in that said processing means (18) includes means (18) for decoding the reproduced signal based on the identification signal.

11. An apparatus according to claim 9, characterized by further comprising:

comparison means (118) for comparing an output from said detection means (117) and the identification signal from said identification signal generating means (14) to detect a coincidence therebetween, and for, when a coincidence output cannot be obtained, driving said output disturbing means (119).

12. A recording apparatus comprising:

input means (11) for receiving a recording signal to be recorded on a recording medium (T);

characterized by said apparatus further comprising:

generating means (14) for generating a predetermined index signal;

recording means (REC) for adding the index signal generated by said generating means to the recording signal, and recording the obtained recording signal on said recording medium (T);

detection means (121) for detecting the index signal added by said recording means (REC) from the recording signal input to said input means (11); and

inhibition means (122) for inhibiting recording of the recording signal on said recording medium (T) by said recording means (REC) when said detection means (121) detects the index signal from the recording signal.

13. A recording apparatus comprising:

input means (11) for receiving a recording signal to be recorded on a recording medium (T);

characterized by said apparatus further comprising:

generating means (14) for generating a predetermined identification signal;

recording means (13, REC) for at least partially encoding the recording signal input to said input means (11) using the identification signal generated by said generating means (14) and recording an encoded recording signal on said recording me-

dium (T);

discrimination means (12) for discriminating whether the recording signal input to said input means (11) is encoded or not; and

inhibition means (10) for inhibiting recording of the recording signal on said recording medium (T) by said recording means (13, REC) when said discrimination means (12) discriminates that the recording signal is encoded.

14. A recording/reproducing system comprising:

generating means (14) for generating a specific identification signal;

recording means (113, REC) for adding the specific identification signal generated by said generating means (14) to a recording signal and recording the recording including the specific identification signal on a recording medium (T);

selection means (12) for selecting based on a predetermined input signal whether or not addition of the specific identification signal by said recording means (113, REC) is performed;

detection means (117) for detecting the identification signal added to the recording signal from a signal read from said recording medium (T);

discrimination means (118) for discriminating whether or not the identification signal detected by said detection means (117) substantially coincides with the specific identification signal; and

disturbing means (119) for disturbing outputting of the signal read from said recording medium (T) when said discrimination means detects a non-coincidence.

15. A system according to claim 14, characterized in that the specific identification signal is a preprogrammed signal inherent to an individual recording/reproducing system.

16. A system according to claim 14, characterized in that said selection means (12) performs selection based on information obtained from the recording signal.

17. A system according to claim 14, characterized in that said selection means (12) performs selection based on a signal supplied upon a predetermined key operation.

18. A system according to claim 14, characterized in that the recording signal consists of a main signal and a sub signal, said recording means (113, REC) adds the specific identification signal together with a predetermined detection signal to the sub signal, and said detection means detects the identification signal based on the detection signal.

19. A system according to claim 14, characterized in that said generating means (14) is detachable with a body of said recording/reproducing system.

20. A recording/reproducing system comprising:

generating means (14) for generating a specific identification signal;

recording means (13, REC) for at least partially encoding a recording signal using the specific identification signal generated by said generating means (14), and recording an encoded recording signal on a recording medium (7);

selection means (12) for selecting based on a predetermined input signal whether or not an encoding operation by said recording means (13, REC) using the specific identification signal is performed;

discrimination means (17) for discriminating whether or not a signal read from the recording medium (T) is encoded; and

decoding means (18) for decoding the signal read from said recording medium based on the specific identification signal or a signal associated therewith when said discrimination means (17) determines that the signal is encoded.

21. A system according to claim 20, characterized in that the specific identification signal is a preprogrammed signal inherent to an individual recording/reproducing system.

22. A system according to claim 20, characterized in that said selection means (12) performs selection based on information obtained from the recording signal.

23. A system according to claim 20, characterized in that said selection means (12) performs selection based on a signal supplied upon a predetermined key operation.

24. A system according to claim 20, characterized in that the recording signal consists of a main signal and a sub signal, the encoding operation is performed by scrambling the main signal or the sub signal and adding a predetermined discrimination signal to the sub signal, and said discrimination means (17) performs discrimination based on a detection result of the discrimination signal from the signal read from the recording medium.

25. A system according to claim 20, characterized in that said generating means is detachable with a body of said recording/reproducing system.

26. A service system for a recording apparatus having a record restriction function comprising:

a recording unit for adding an identification code for a recording or reproducing restriction to a recording signal including a recording or reproducing restriction signal; and

identification code means, detachable with said recording unit, for providing an identification code for said recording unit.

27. A service system for a recording apparatus having a record restriction function comprising:

a recording unit (203) having identification

means for selectively recording a recording signal including a recording restriction signal and an identification code for recording restriction; and

identification code means (201), detachable with said recording unit, for providing an identification code for said identification means. 5

28. A service system for a reproducing apparatus having a reproducing restriction function comprising:

a reproducing unit which includes means for selectively processing a reproduced signal including a reproducing restriction signal and an identification code for reproducing restriction; and 10

identification code means, detachable with said reproducing unit, for providing an identification code for said processing means. 15

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FIG. 1A

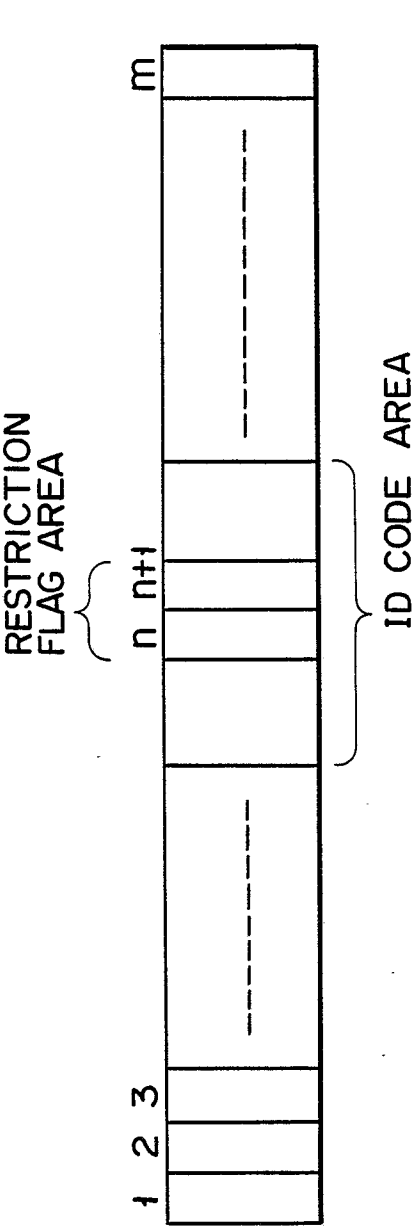
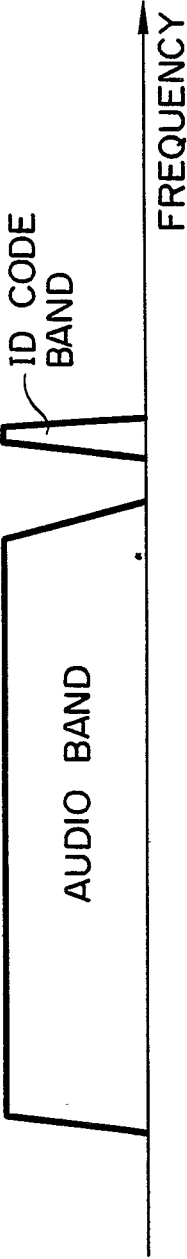
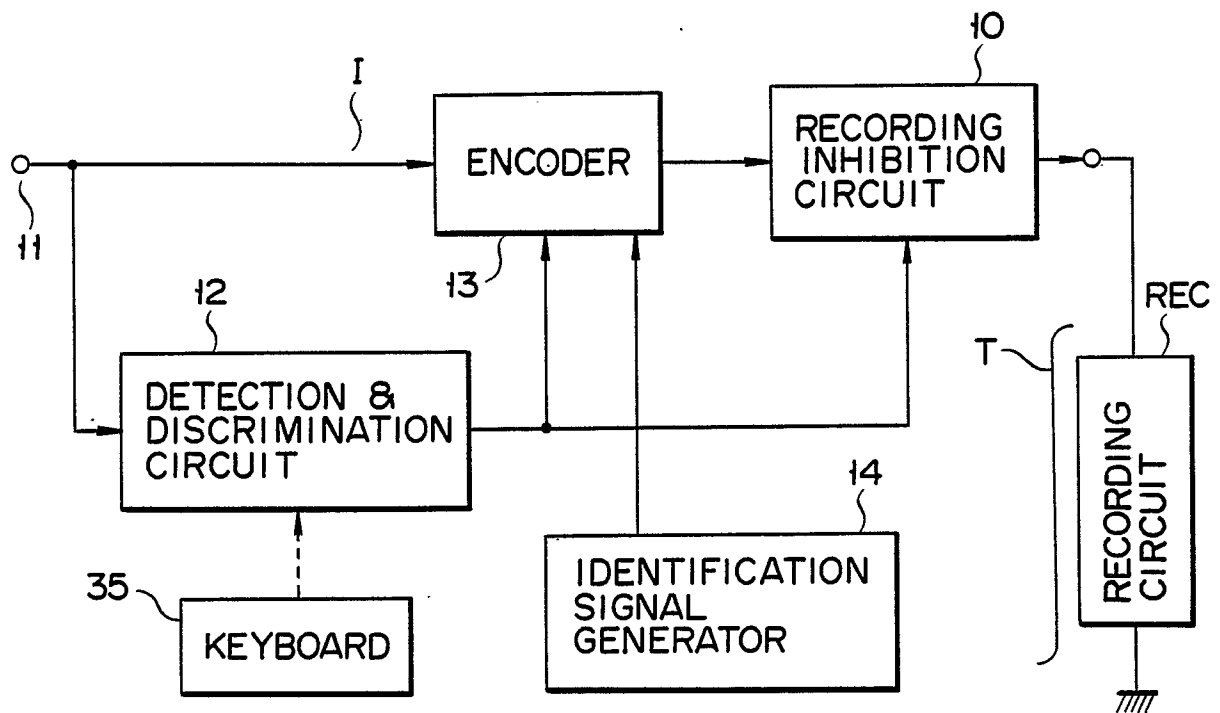
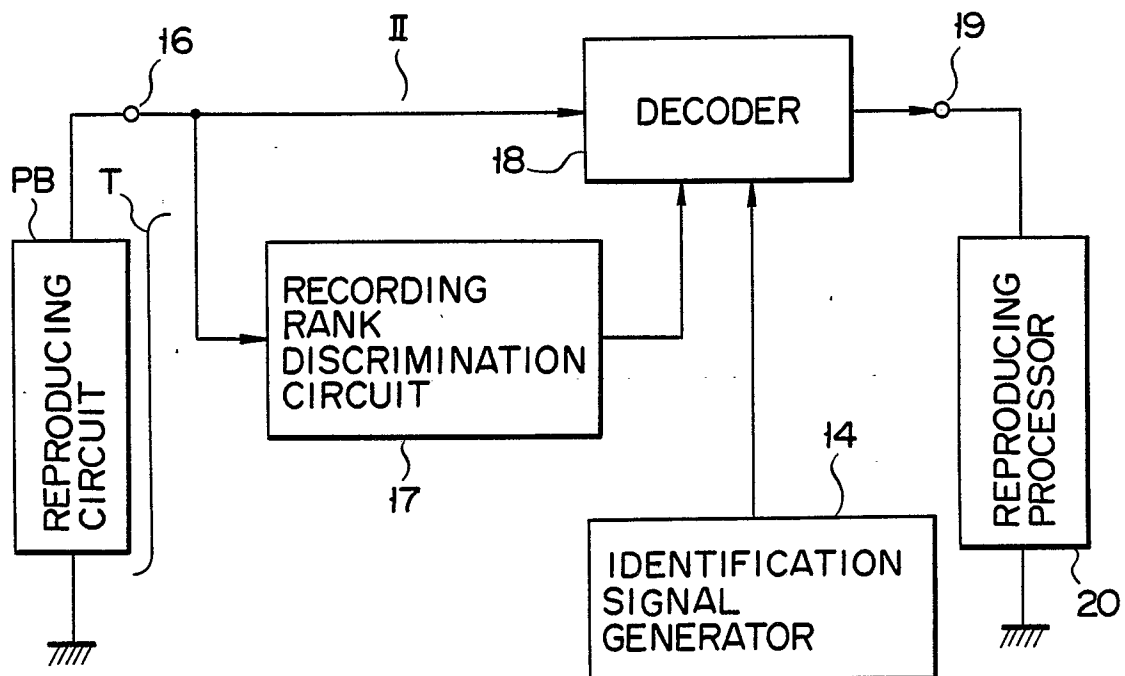


FIG. 1B





F I G. 2



F I G. 3

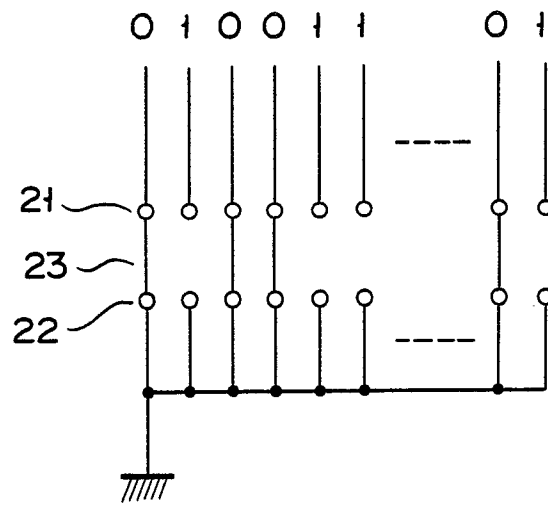


FIG. 4

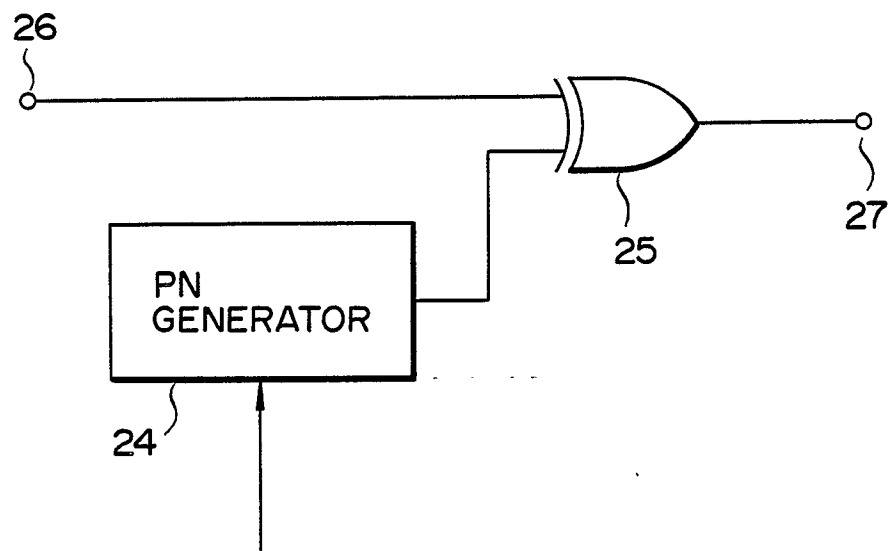
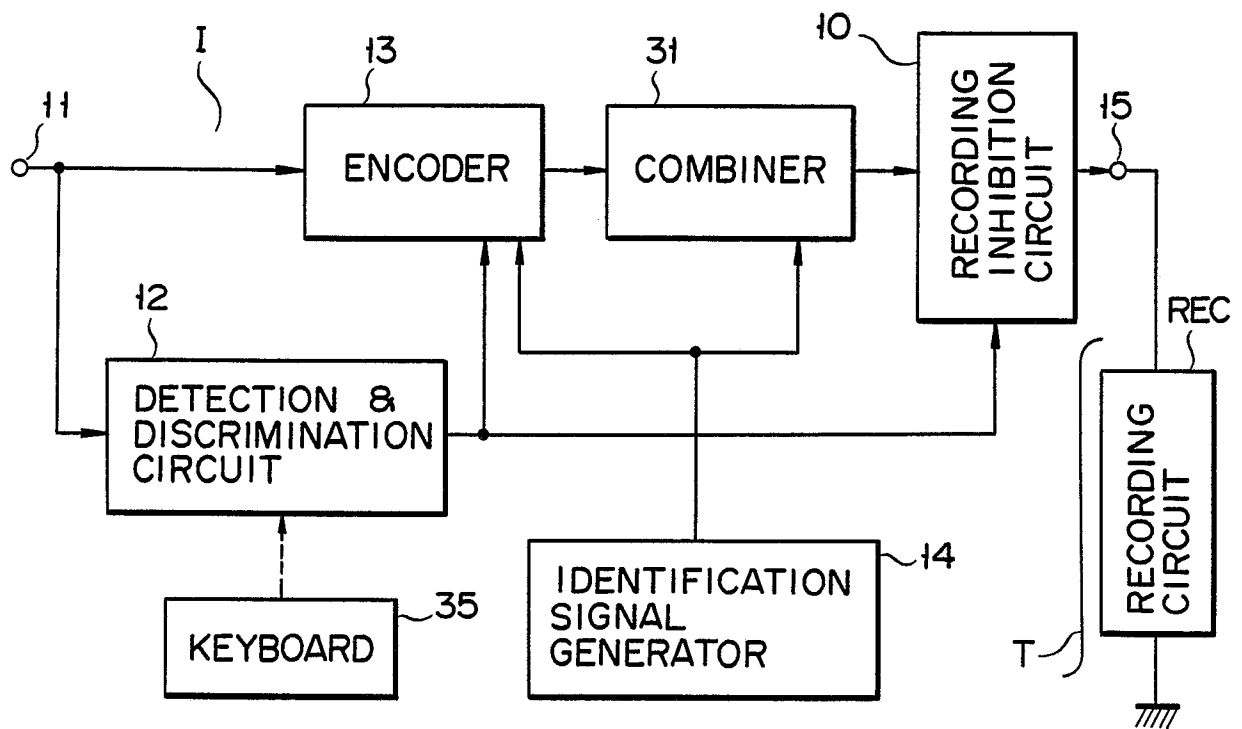
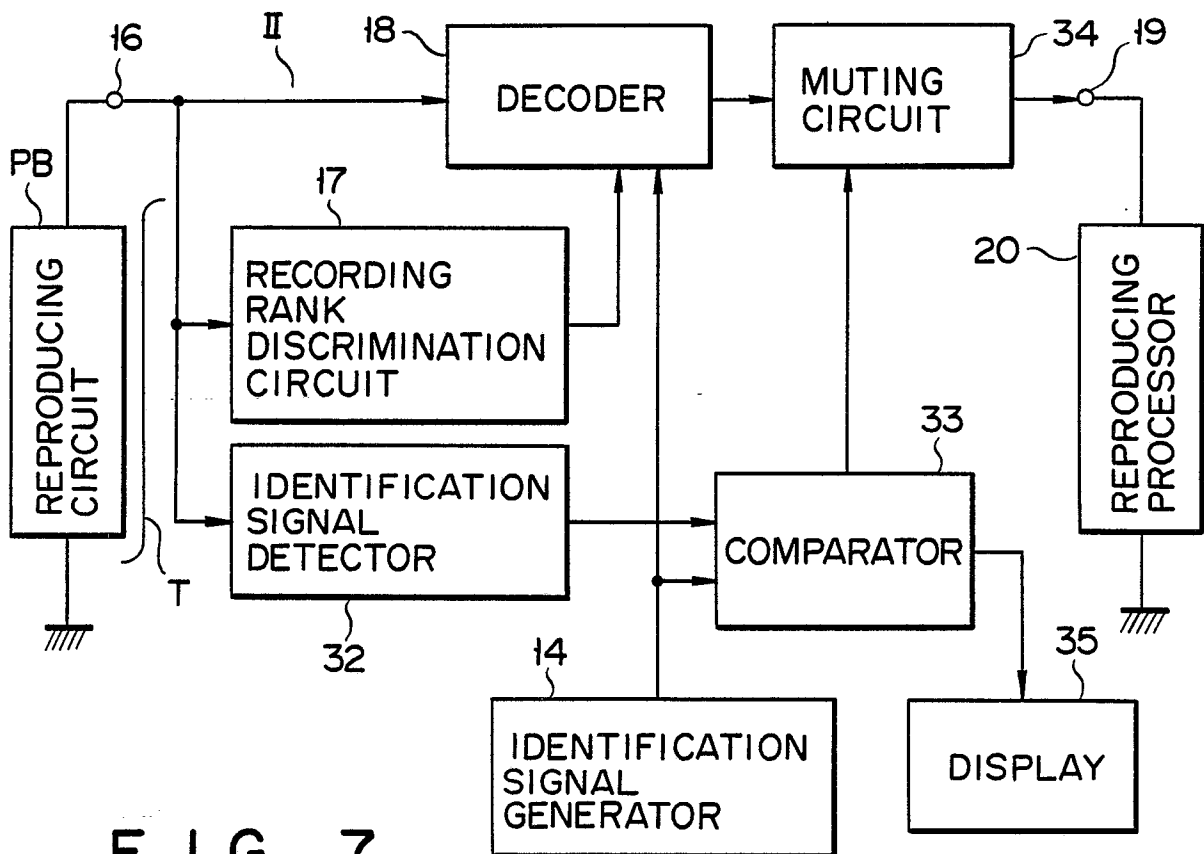


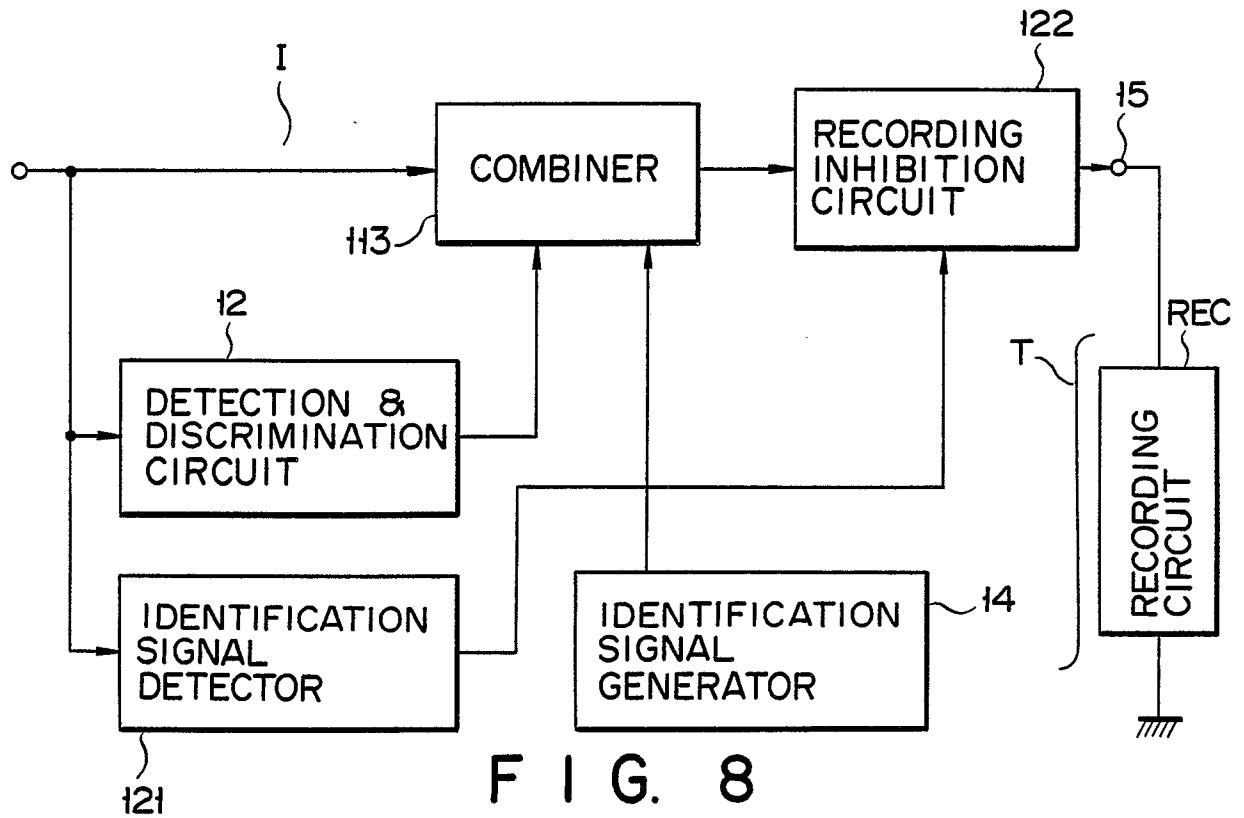
FIG. 5



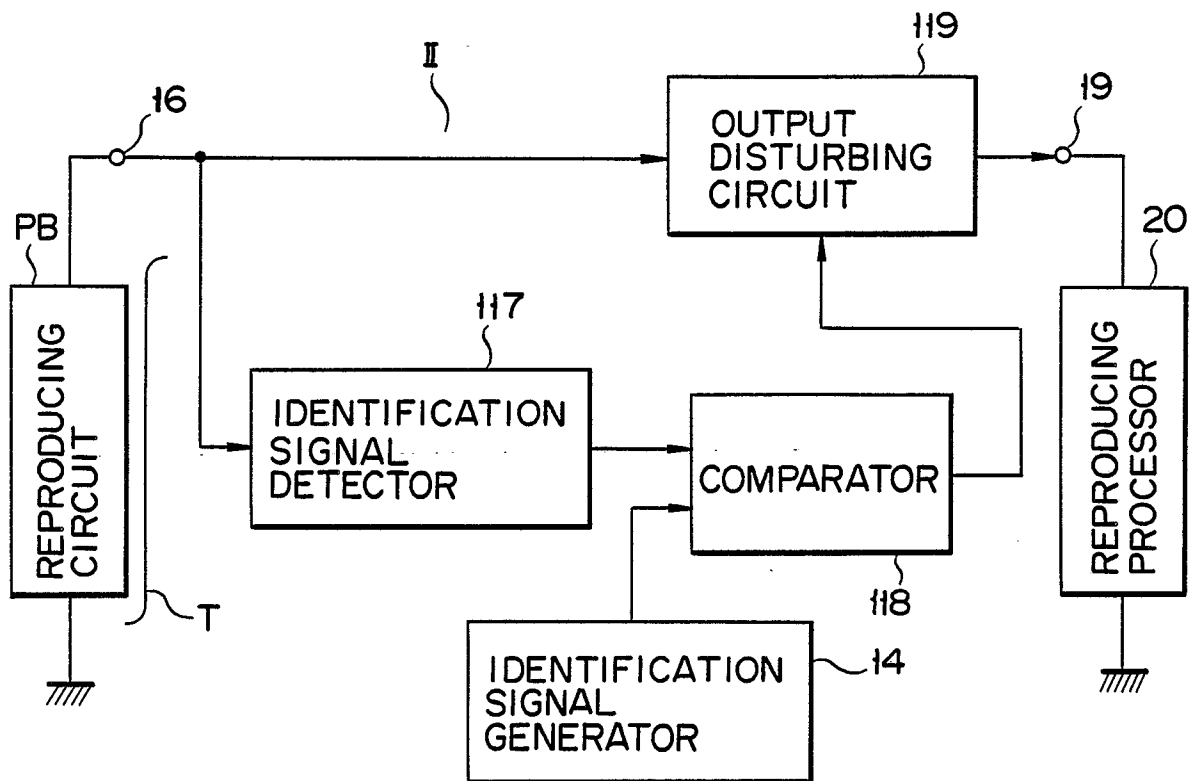
F I G. 6



F I G. 7



F I G. 8



F I G. 9

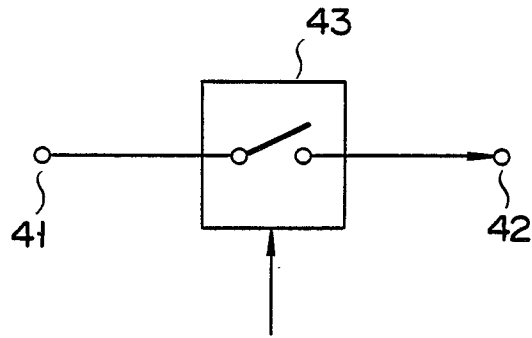


FIG. 10

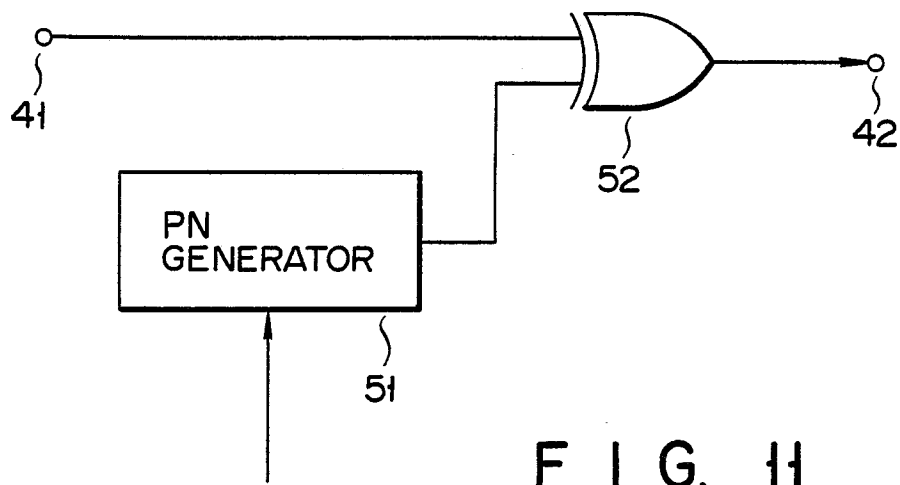


FIG. 11

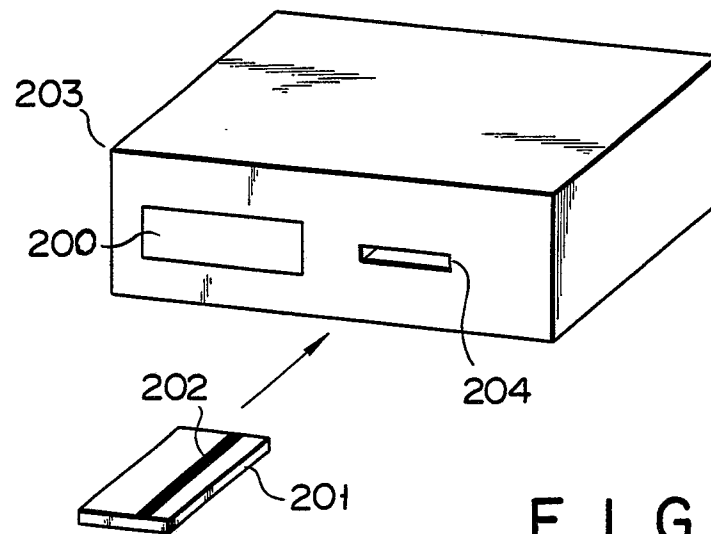


FIG. 12

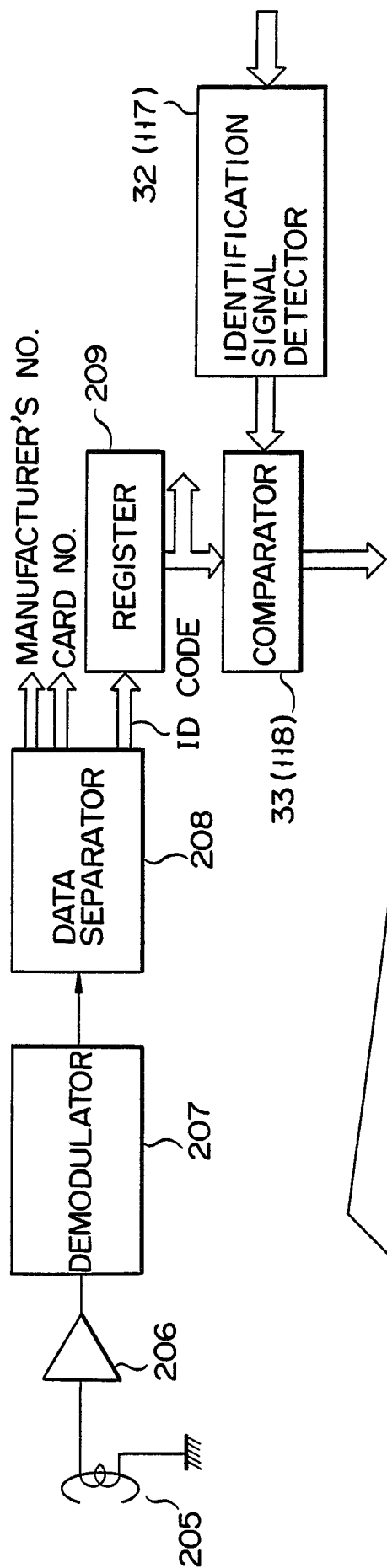


FIG. 13

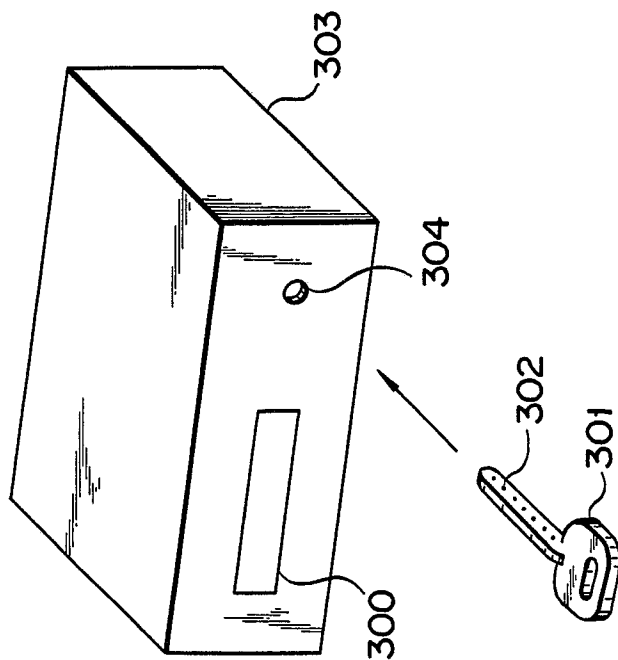


FIG. 14

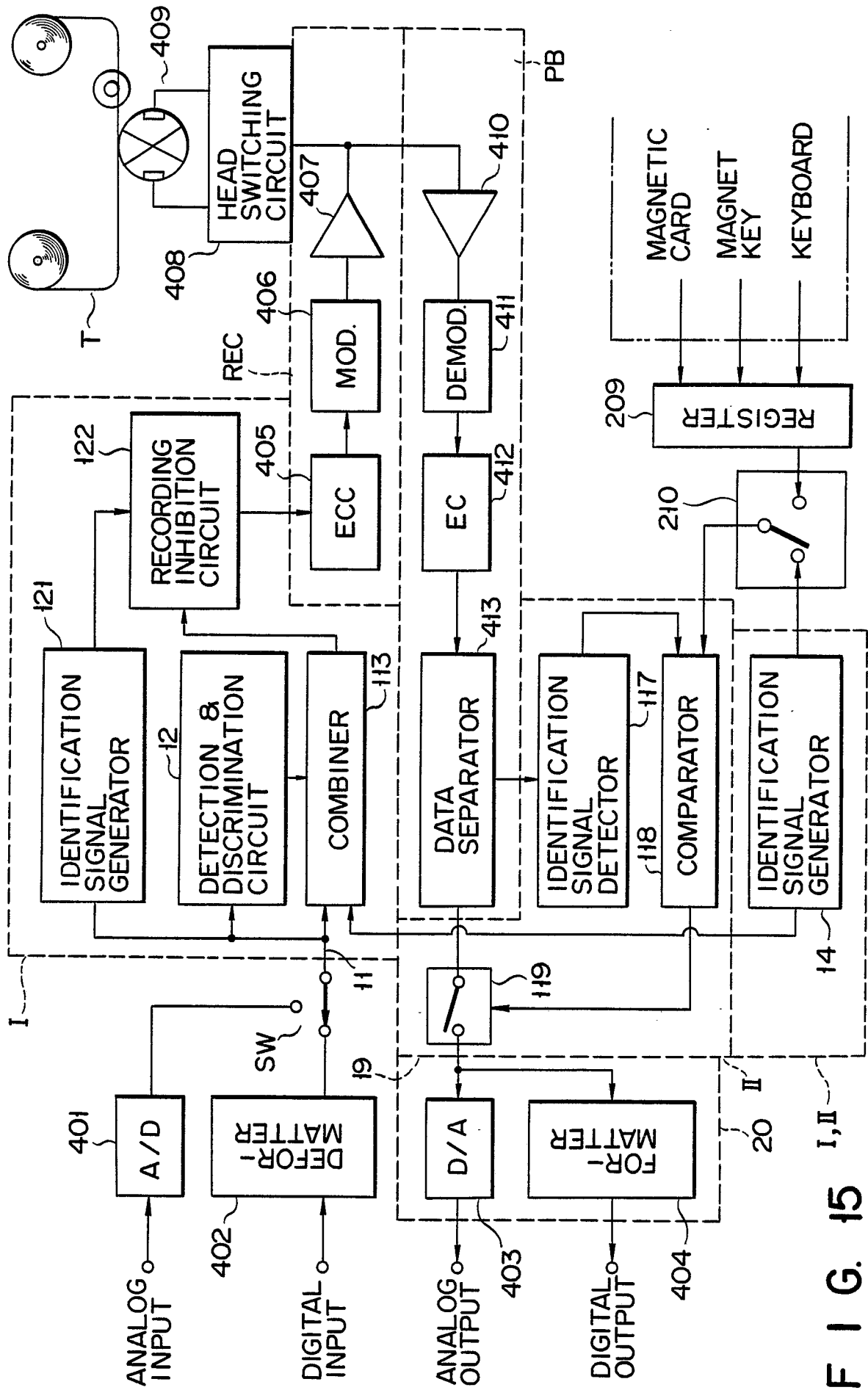


FIG. 15